

Lives Saved Report:
Saving 4.6 million lives in Indonesia

The impact of complementing tobacco control with harm reduction and improved lung cancer treatment by 2060

REPORT SUPPORTED BY INTERNATIONAL AND LOCAL TOBACCO HARM REDUCTION EXPERTS

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Contents

1. Executive Summary

GLOBAL PROGRESS TO END SMOKING HAS STALLED. CURRENT APPROACHES TO TOBACCO CONTROL HAVE NOT BEEN SUFFICIENT. THE WORLD HEALTH ORGANIZATION (WHO) PROJECTS THAT 1.27 BILLION PEOPLE GLOBALLY WILL SMOKE BY 2025. OVER EIGHT MILLION ANNUALLY WILL DIE FROM TOBACCO USE. THIS IS UNACCEPTABLE FROM A PUBLIC HEALTH PERSPECTIVE.

This report focuses on Indonesia. A total of 283 million people live in this country. Of these, 300,000 die prematurely every year because they use tobacco products. WHO projects that smoking prevalence in Indonesia will increase from 31.7% in 2000 to 37.5% in 2025. Figure 1. shows the male (64.7%) and female (2.3%) smoking rates.

INDONESIA HAS THE HIGHEST MALE SMOKING PREVALENCE ON EARTH.

The delay in preventing tobacco-related disease, disability and premature deaths calls for urgent action. Data presented in this report shows that tobacco use contributes to several major causes of death in Indonesia that are set to increase over the next few decades. These include lung cancer, COPD, heart disease, tuberculosis, and stroke. They will impose significant human and economic costs, especially among men. The report considers how tobacco harm reduction (THR) products could reduce this burden. THR products use nicotine without the deadly exposures that cause harm. THR products (e-cigarettes/vapes, heated tobacco products, snus, oral nicotine pouches, and e-shisha products) are rapidly gaining traction among consumers worldwide. But these innovations have not yet been embraced by physicians and governments as key to cutting premature deaths.

The report comes as the quality of evidence on the benefits of smoking cessation and THR has strengthened. Cessation at every age is associated with longer survival, and switching to THR products is almost twice as effective for cessation as nicotine replacement therapies. While long-term studies on the health benefit effects of switching to THR are still needed, results of studies using biomarkers of future diseases are promising. Biomarkers can play a crucial role in tobacco control, by providing measurable and earlier indicators of exposure to tobacco-related toxicants and the potential harm they cause.

This report also comes at a time when many countries have recently reversed bans on many THR products and liberalized their approach to THR. New and innovative THR products are being developed worldwide and their role in smoking cessation and harm reduction is well documented. A further sign of growing acceptance of the value of THR and the demand for them by consumers.

An example of a government recognising the public health value of integrating harm reduction into its tobacco control policy is St. Kits and Nevis. The former Prime Minister and current Trade Minister, Dr. Denzil Douglas stated in New York during the September 2024 New Approaches conference:

"Research clearly supports the harm reduction potential of non-combustible nicotine products. According to Public Health England, vaping is estimated to be about 95% less harmful than smoking. Similarly, heated tobacco products, which heat tobacco rather than burn it, produce significantly lower levels of harmful toxins compared to traditional cigarettes. Harm reduction is not a compromise—it is a critical and compassionate part of tobacco control that recognizes the reality that millions of people continue to smoke, despite knowing the risks. The WHO Framework Convention on Tobacco Control gives us the tools to address this challenge, but we must act with a comprehensive strategy that includes harm reduction at its core. We cannot afford to ignore the evidence. By embracing harm reduction as a core component of the FCTC, we could save millions of lives, reduce healthcare costs, and create a future where far fewer people suffer from the devastating consequences of smoking."

We note that, although the use of the full range of THR products are permitted in Indonesia, the expanded use of these by those people who smoke and cannot or will not quit, remains disappointingly low. We recommend the government to consider their use. Health gains would be greatly increased if smoke free nicotine alternative products were to be made more accessible, affordable and acceptable.

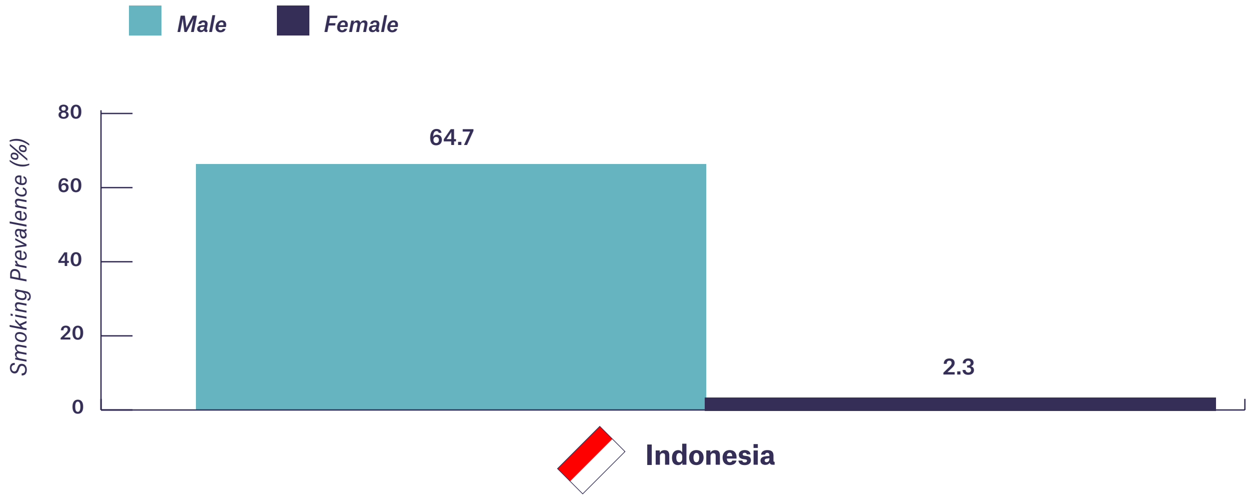
It is important to note, that as of November 2024, the Indonesian government has not yet verified the Framework Convention on Tobacco Control (FCTC). This paradoxically provides the opportunity for a more rapid integration of harm reduction methods into its tobacco control policy, as mentioned in Article 1 (d)s of the FCTC. In addition, it would not be bound by the FCTC Article 5.3, so would be able to engage with all stakeholders in developing its own tobacco harm reduction policy.

We calculated the combined impact of embracing THR, better cessation services, and improved lung cancer treatment in Indonesia on long term trends in health.

The analysis shows that over 4,616,000 lives could be saved by 2060 through these interventions, compared to continuing with current WHO-directed tobacco control efforts alone.

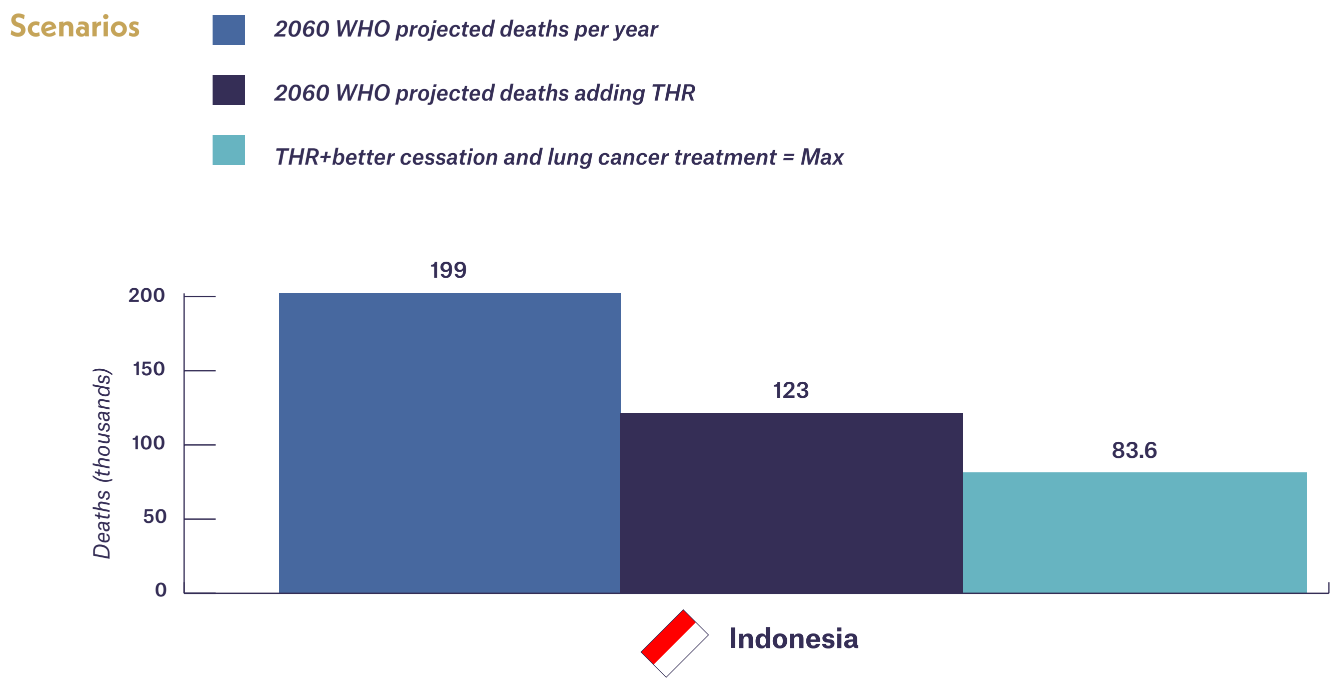


Figure 1: Indonesia adult smoking rates by sex, 2023



Data Source: WHO report on the global tobacco epidemic 2023 country profiles Indonesia: https://www.who.int/publications/m/item/tobacco-idn-2023-country-profile

Figure 2: Decrease in tobacco-related deaths, if THR were implemented in Indonesia along with improved cessation and early diagnosis of lung cancer





To achieve these gains, key actions are needed, including:

- **Activating health professionals (especially physicians) to communicate the benefits of THR to patients in all clinical encounters, to counter disinformation about nicotine and the value of THR, and to develop national equivalents of the Royal College of Physicians report on THR and smoke free nicotine alternatives to provide guidance to physicians.**
- **Encouraging risk-proportionate regulation: Governments should consider to embrace the role of harm reduction in tobacco control, as mentioned in Article 1(d) of the FCTC. They should condiser to integrate THR into broader national approaches to harm reduction by continuing to revise legislation and taxation to improve access to THR products and invest in national science and research to guide and advance THR.**
- **Governments should invest in national science and research. Local investment in science and scientists has at least three effects: a) it ensures that locally relevant research is developed, b) it leads to the strengthening of local expertise and c) building local expertise in science leads to better evidence-based local policies and informed policy makers.**
- **Strengthening consumer representation: Strengthen the role and effectiveness of independent science-based consumer groups who advocate for THR progress and do so in an integrated way with other major national harm reduction advocacy and consumer groups.**
- **Where appropriate, involving religious leaders and their communities: Supporting religious leaders to guide their communities to quit smoking and support tobacco harm reduction.**

Embracing THR, cessation, and improved lung cancer treatment represents a major opportunity for Indonesia to dramatically improve the health of its populations and demonstrate needed global leadership.

2. Rationale

GLOBAL PROGRESS TO END SMOKING HAS STALLED

Current approaches to tobacco control have stalled. The World Health Organization (WHO) projects that 1.27 billion people globally will smoke by 2025[1], and that tobacco use will kill 8.7 million annually.[2] Deaths are projected by WHO to increase to 10 million in five years before declining to about 6.5 million by 2060.[3] This is not what public health success looks like.

A robust debate is needed to better understand the risks and benefits of harm reduction methods in tobacco control. This point was powerfully made by Jindřich Vobořil, Expert on Drugs Policy & Addictions, Advisor to the Prime Minister of the Czech Republic, who stated at the New Approaches Conference in New York, September 2024:

"The scientific debate of harm reduction is still missing in the EU. Products should be regulated according to their risks.

There is a high certainty of evidence that alternatives including e-cigarettes and other products, increase quit rates compared to the other products made by pharma. The consumer preference must be central to the whole policy.

We must take into account research - put money into research to reduce harms, and take into account ongoing innovative possibilities. It is irresponsible to say we do not have enough data. Let's put money into research to see if these products can save lives. We must push alternatives forward."

Based on the WHO report on the global tobacco epidemic, 2023,[2] in 2021 Indonesia had an adult daily smoking prevalence of 31%. This figure obscures large differences in tobacco use by sex. As seen in Table 1, while Indonesia has a male smoking prevalence of 64.7%, the female smoking prevalence is only 2.3%.

This report aims to provide an alternative vision of what is possible. We consider the benefits of interventions based on tobacco harm reduction (THR) products, which include nicotine without the deadly exposures from cigarette smoke that cause the harm. ***"Nicotine itself does not cause cancer, lung disease, heart disease or stroke and has been used safely for many years in medicines to help people to stop smoking."***[4]

These products include vapes, oral nicotine pouches, e-shisha and heated tobacco products, which are all available in Indonesia. They are gaining traction among consumers but are not yet embraced by physicians and governments as key to cutting premature deaths. We also consider the benefits of better treatment for lung cancer, knowing it accounts worldwide for 2.5 million cases and 1.8 million deaths a year.[5]

Although the Indonesian healthcare system might not be as advanced in regularly updating its cancer diagnostic and treatment programs, the use of emerging technologies, such as AI-assisted (artificial intelligence) diagnostics, might assist the country to address lung cancer in a more effective manner.



WHO NEGLECTS THE LIFE-SAVING POTENTIAL OF TECHNOLOGICAL INNOVATION

The WHO Framework Convention on Tobacco Control (FCTC) is the first international health treaty negotiated under the auspices of WHO. FCTC has led international control efforts for over two decades. Decisions taken at its governing body's 2024 gathering (known as COP10) focused on a variety of worthy issues, including environmental effects of tobacco cultivation and cigarette filters, and guidelines for tobacco advertising and media promotion.[6] As mentioned before, Indonesia is the last major country in Asia that has not ratified the FCTC so it is not bound by articles or any other provisions. This creates real opportunities for leadership in advance of ratifying.[7]

The omission of a focus on THR has two unfortunate implications. First, it perpetuates a view among public health experts that innovation and new technology is irrelevant to ending smoking. Second, it implies that equity in access to effective, life-saving technologies does not matter in tobacco control. That partly explains why access to nicotine replacement therapies (NRT) remains paltry across low and middle income countries (LMICs).[8] This is despite NRTs having been included on the WHO Essential Drug List in 2009.[9]

We have seen remarkable progress across the fields of biotechnology, pharmaceutical innovation and diagnostics led by private companies and supported in part by leading health research funders like the U.S. National Institutes of Health (NIH). The result is that a range of THR products have met the United States Food and Drug Administration (USFDA) criteria of being ***appropriate for the protection of public health.***[10] To date, the FDA has authorized marketing of 45 products, including 34 tobacco- and menthol-flavoured e-cigarette products and devices. They include four major categories: heated tobacco products, e-cigarettes, snus, and oral nicotine pouches.[11] All of them use nicotine. None involve combustion. All substantially reduce exposure to the toxic substances in combustible cigarettes.[12,13]

In the Middle East one new addition, a charcoal-free shisha, represents a unique potential contribution to tobacco harm reduction led by Middle East innovation.[13,14]

3. Benefits of Tobacco Harm Reduction (THR)

THE QUALITY OF EVIDENCE ABOUT THE BENEFITS OF THR FOR CESSATION AND HARM REDUCTION HAS STRENGTHENED

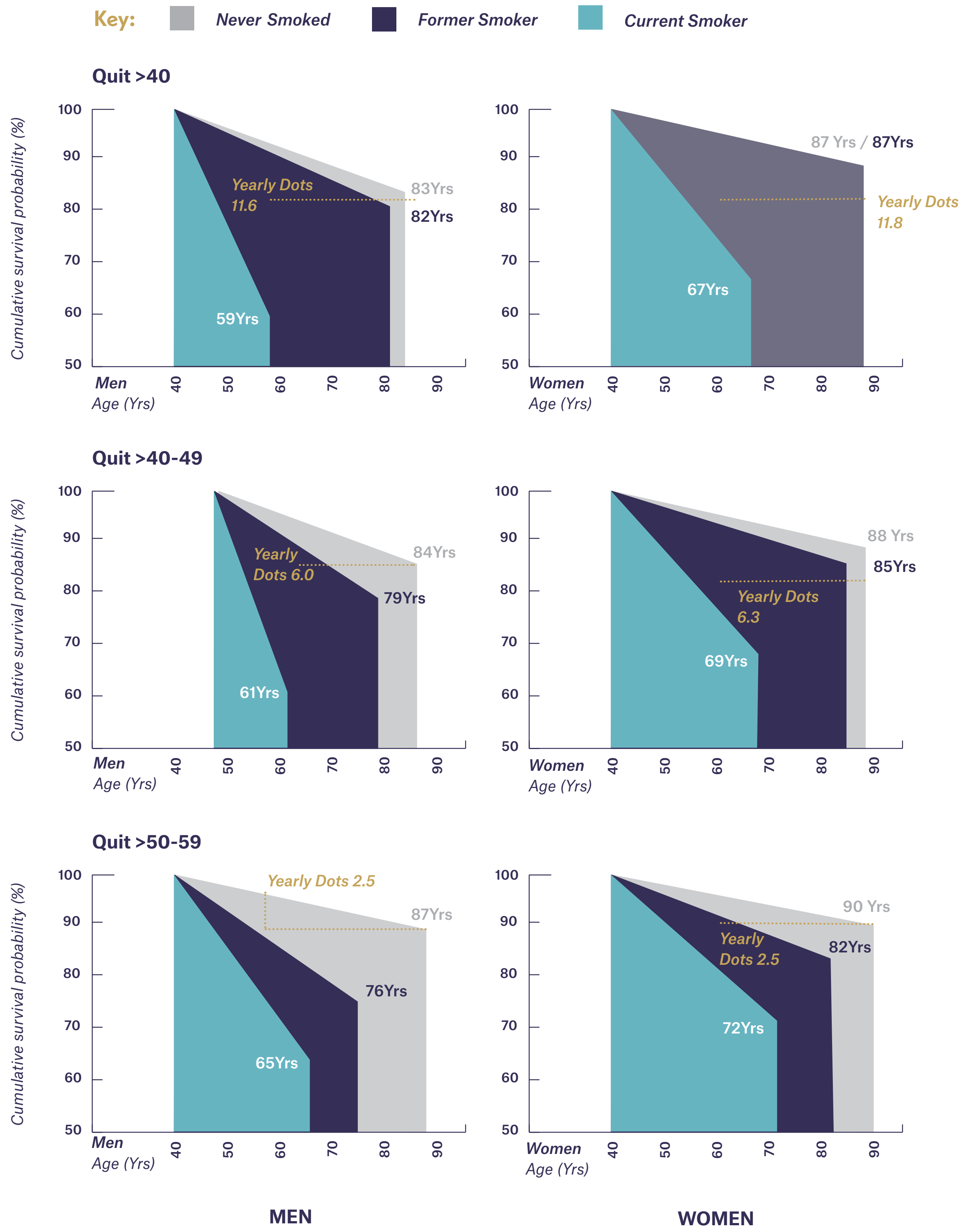
During 2024, leading medical journals have published views that support the value of smoking cessation and tobacco harm reduction.

Cho and colleagues, writing in NEJM Evidence[15], draw on four national cohorts involving 1.48 million people followed for 15 years to produce updated data on the benefits of adult cessation by age. They state that ***"Cessation at every age was associated with longer survival, particularly cessation before 40 years of age."***[15]

Cho et al. show no differences in survival between men and women who never and formerly smoked before age 40, compared to a decade difference among those who quit between 50-59. Note that in the older age group, former smokers still show a decade advantage in survival compared to current smokers. No other public health interventions can achieve this for people at age 50.



Figure 3: Life expectancy gains by age in men and women
This figure shows an Illustrative model, based on the article by Cho et al, NEJM Evidence, 2024[15]



Pair this with a Korean study from JAMA Network Open, focused on cancer risk following cessation. Almost three million people were followed for over 15 years. Regardless of quitting age, a significant reduction in cancer risk was observed.[16]

The Lancet[17] and the New England Journal of Medicine[18] each recently carried articles calling for a greater focus on the value of THR for cessation. Beaglehole and Bonita (both previous directors of chronic diseases at WHO), writing in The Lancet, make the case for WHO to adopt THR to save lives. As they note, ***"The FCTC does not prohibit harm reduction approaches but leaves it up to countries to decide how to regulate e-cigarettes and other novel nicotine products."*** Further, ***"WHO's lack of endorsement of tobacco harm reduction limits healthier choices for the 1·3 billion people globally who smoke and who are at an increased risk of early death."***

Nancy Rigotti of Harvard Medical School, writing in the NEJM, suggests that we have reached a ***"tipping point"*** in the quality of trial evidence, that requires physicians to ***"acknowledge this progress and add e-cigarettes to the smoking cessation toolkit."***

Why does this matter for THR? Multiple studies, and Cochrane systematic reviews[19], conclude that e-cigarettes (vapes) are almost twice as effective as achieving cessation than NRTs. In short, current evidence suggests that e-cigarettes are the most widely available effective means for smokers to quit. Cho et al.'s comments in the NEJM about the benefits of smoking cessation at every age do not differentiate between cessation methods; they apply to quitting with THR products or with NRTs.

More studies are needed to thoroughly assess the effectiveness of snus, nicotine pouches, and heated tobacco products as cessation interventions. Further, there is a major gap in knowledge about how to reach those who smoke, who are older than 40 years of age, and smoke heavily (more than 20 cigarettes a day). The recent WHO guidelines on cessation ignores the potential health gains that addressing this group of smokers would achieve. They constitute about 20-25% of all adult smokers yet account for over 70% of all lung cancer and COPD cases. Manufacturers of THR products have also not addressed these smokers tending to focus on younger, lighter smokers.[20]

The United States' FDA has granted "modified risk tobacco product" status to some oral and heated tobacco products based on submitted scientific evidence.[21] Real-world evidence also exists, including meaningful reductions in cigarette smoking in countries such as Sweden and Japan due to switching to THR products.[22]

Because these are newer technologies, we do not have studies on long-term effects of switching to THR products. In the meantime, we can look to the plethora of impressive studies using biomarkers of outcomes that have high predictive value for cancers, respiratory and heart disease.[23,24,25] These studies are used by companies in their USFDA applications and deserve to be cited and used more extensively by the public health community when motivating policy makers.

Table 1 shows the current state of play regarding clinical trials, cessation and all major THR categories. It shows that randomised critical trials (RCTs) and solid evidence about the effectiveness of cessation is strongest for e-cigarettes, research is underway in other categories. Given the diversity of THR use and legal availability, Indonesia is well placed to carry out research across several THR categories.

Table 1: Status of randomised clinical trials (RCTs) to assess the effectiveness of THR for cessation

E-CIGARETTES (VAPES) Several RCTs have been completed allowing for a continuously updated systematic review by the Cochrane Collaboration.	**Electronic cigarettes for smoking cessation - Lindson, N - 2024 | Cochrane Library**
ORAL NICOTINE POUCHES No systematic review. Several studies are in progress.	**Project 3: Randomised Placebo-controlled Trial of Nicotine Pouches in Smokers — Penn State (psu.edu)**
	Clinical study protocol on electronic cigarettes and nicotine pouches for smoking cessation in Pakistan: a randomised controlled trial - PMC (nih.gov)
	Using Pod Based E-Cigarettes and Nicotine Pouches to Reduce Harm for Adults with Low Socioeconomic Status Who Smoke: A Pilot Randomised Controlled Trial | Nicotine & Tobacco Research | Oxford Academic (oup.com)
	JMIR Research Protocols - Biomarkers of Exposure and Potential Harm in Exclusive Users of Nicotine Pouches and Current, Former, and Never Smokers: Protocol for a Cross-sectional Clinical Study
SNUS No systematic review but there are several completed studies.	**Randomised Trial to Compare Smoking Cessation Rates of Snus, With and Without Smokeless Tobacco Health-Related Information, and a Nicotine Lozenge | Nicotine & Tobacco Research | Oxford Academic (oup.com)**
	Randomised clinical trial of snus versus medicinal nicotine among smokers interested in product switching | Tobacco Control (bmj.com)
	Randomised Clinical Trial of Snus Examining the Effect of Complete Versus Partial Cigarette Substitution on Smoking-Related Behaviors, and Bio-markers of Exposure | Nicotine & Tobacco Research | Oxford Academic (oup.com)
HEATED TOBACCO PRODUCTS One study published with an update to 24 weeks being completed.	**Comparing the Effectiveness, Tolerability, and Acceptability of Heated Tobacco Products and Refillable Electronic Cigarettes for Cigarette Substitution (CEASEFIRE): Randomised Controlled Trial - PMC (nih.gov)**

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COUNTRY-SPECIFIC STUDIES OF LIVES SAVED ARE NEEDED TO DRIVE FOR NATIONAL CHANGE

Across diverse disciplines, there is a long history of using rigorous methods to provide data on alternative futures.[26] Such "foresight studies" provide policy makers and the public a compelling vision of a future that is better than the status quo and is possible through the application of knowledge and interventions available today. We apply such an approach to show that it is possible to influence the course of the tobacco epidemic.



4. Analysis of key indicators in Indonesia

Indonesia has a population of 278.9 million. 64.5 million adults smoke, and 300,000 people die prematurely every year from combustible tobacco and toxic smokeless tobacco products.[27]

GDP per capita in Indonesia is $4,900. Life expectancy for men is 67.3 years and 72 years for women.[27]

Table 2: Demographic and development data for Indonesia

	Indonesia
GDP/capita in thousands $	4.9
Mean years of schooling (2022)	8.6
Population in millions	278.9
2021 Life Expectancy (Males/Females)	
MALES	67.3
FEMALES	72.0

Data source: IHME country profiles.
https://www.healthdata.org/research-analysis/health-by-location/profiles
and World Bank for GDP - *https://data.worldbank.org/indicator/NY.GDP.PCAP.CD*
and UNDP - *https://hdr.undp.org/data-center/specific-country-data#/countries/*

Table 3: Top five risks underpinning death, disease, and disability in Indonesia

Indonesia

Rank (2021)	
1	High Blood Pressure
2	Tobacco
3	Diet
4	Air Pollution
5	Malnutrition

Data source: *IHME country profiles. https://www.healthdata.org/research-analysis/health-by-location/profiles*

Table 3 shows that tobacco use features as one of the top five risks in Indonesia. Diet-related and clinical factors related to chronic disease feature strongly as major risks driving the burden of disease, with high blood pressure as the top risk.

Table 4: Smoking rates and numbers of smokers in Indonesia

Indonesia

	Smoking Prevalence (%)
MALES	64.7
FEMALES	2.3
WHO estimated 2025 prevalence	37.5

Data source: *Smoking Prevalence and WHO survey year: WHO report on the global tobacco epidemic 2023 country profiles*

WHO estimates 2025 prevalence: *WHO global report on trends in prevalence of tobacco use 2000–2030 (https://www.who.int/publications/i/item/9789240088283)*

Note that there are very large differences between the male and female smoking rates. In Indonesia, the male smoking rate is among the highest in the world and reflects smoking rates last seen in the UK well over 40 years ago.

The opportunity to ensure that women maintain such low rates demands greater support in efforts to promote their behaviour as the desired social and health goals. Industry should be required to show that they are not marketing any smoking related products to women in much the same way they are required to do this for youth.

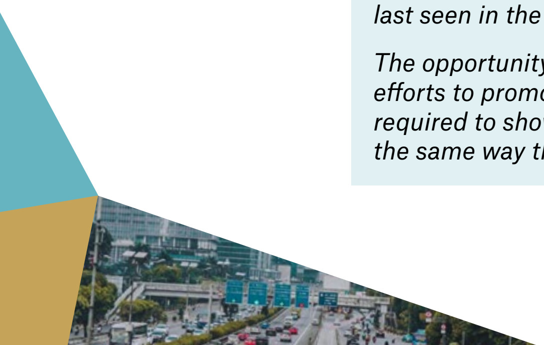
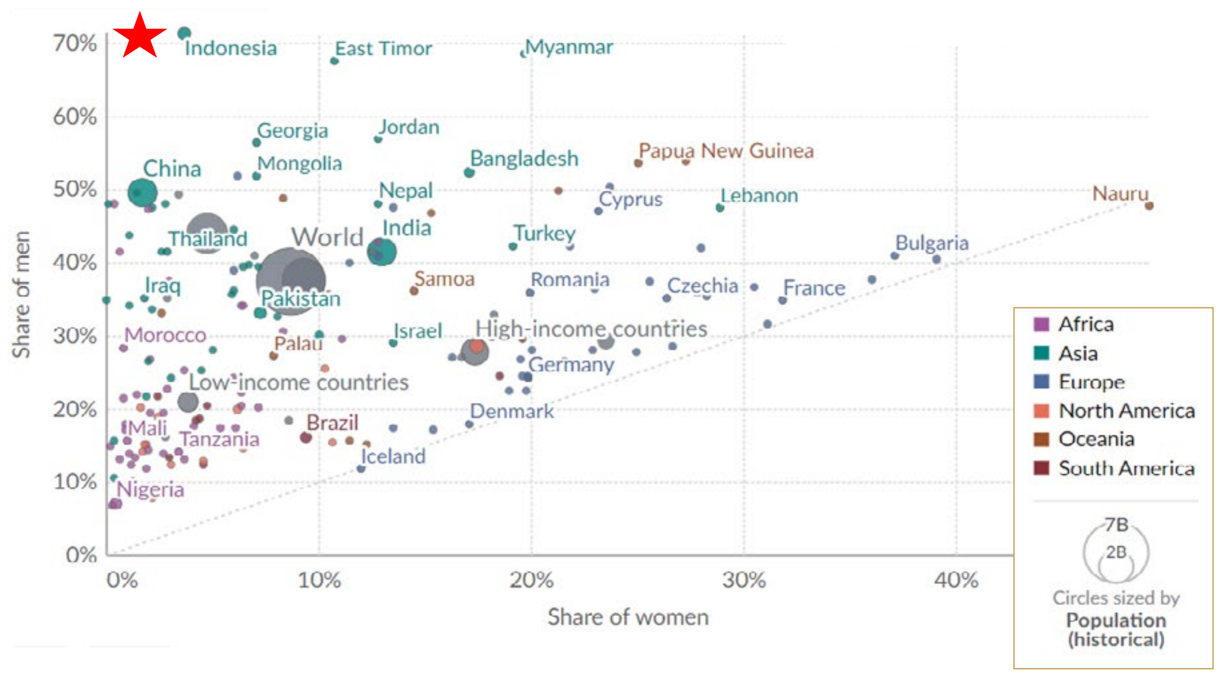




Figure 4: Smoking in men vs. women, 2020

The share of men versus the share of women aged 15 years and older who smoke any form of tobacco, including cigarettes, cigars, pipes or any other smoked tobacco products. Electronic cigarettes are not included.



Data source: *World Health Organization (Via World Bank)*

Table 5: Diversity of tobacco use and harm reduction products in Indonesia

Indonesia

Category	Product Examples	Prevalence in Indonesia	Public Health Concerns	Relation to Menthol Debates Globally
Cigarettes (Combustible)	**Kretek (Clove Cigarettes), White Cigarettes**	Most common form of tobacco use, especially among men (67.2% male smoking prevalence)	High risk of smoking-related diseases such as lung cancer, cardiovascular disease	Menthol has been banned in places like the EU and the US due to its appeals to youth and concerns about cultural preferences. Clove cigarettes could face similar scrutiny
Multiple Flavoured Vapes	**E-cigarettes with flavouring**	Growing market, popular among young adults	Concerns over youth uptake and gateway effect to smoking	Similar to menthol, flavour bans in other countries (EU/US) focus on reducing youth appeal. Clove flavour could be similarly regulated
E-shisha (Electronic Shisha)	**E-shisha pens, flavoured shisha products**	Increasing presence, especially in urban areas	Less harmful than combustible tobacco but concerns over nicotine addiction and youth uptake	Menthol bans in Western countries focus on the appeal of flavoured tobacco products to young people. E-shisha flavours could face similar scrutiny
Heated Tobacco Products (HTPs)	**IQOS, Glo, other heated tobacco devices**	Introduced to the market as harm reduction products, but uptake is still low	Less harmful than smoking but still pose risks, especially concerning nicotine addiction	Similar debates on flavours could emerge, especially on flavours that attract youth

Data source: *Global State of Tobacco Harm Reduction (GSTHR) (2022)*, GSTHR reports provide an overview of the availability and use of harm reduction products such as nicotine pouches, heated tobacco, and e-cigarettes in various countries, including Indonesia.

Available at: GSTHR Indonesia Overview.

Table 6: Top ten causes of death in 2021 in Indonesia (IHME). Those strongly related to tobacco are highlighted

Indonesia

Rank (2021)	
1	**Stroke**
2	**Ischaemic Heart Disease (IHD)**
3	Covid-19
4	Cirrhosis
5	**Tuberculosis (TB)**
6	**Chronic Obstructive Pulmonary Disease (COPD)**
7	Diabetes
8	Hypertensive Heart Disease
9	**Lung Cancer**
10	Chronic kidney disease (CKD)

Data source: *IHME country profiles.*
https://www.healthdata.org/research-analysis/health-by-location/profiles

Smoking is a major cause of chronic obstructive pulmonary disease (COPD), ischaemic heart disease (IHD), stroke, tuberculosis, and lung cancer deaths. The table shows the importance of other important risks: the impact of COVID 19, alcohol, diet and obesity. This triple burden of diseases strains the ability of health systems.

Indonesia, as one of the world's largest markets for smoking tobacco, is significantly affected by smoking-related illness. Previous research has shown that smoking causes several diseases, including stroke, neoplasm and coronary heart disease. There has been some research on the hazard risk of smoking for all-cause mortality in Indonesia. Holipah et al aimed to identify the association between smoking and all-cause mortality rates in Indonesia. In their article,[28,a,b,c] they report that the ***"number of smokers remains high and is expected to increase gradually every year"***. Worldwide, this is the last country with a large population where smoking is increasing. Tobacco deaths account for 25% of all male deaths and 7% all female deaths. A firm government policy is needed to reduce the number of smokers in Indonesia which would automatically reduce the health problem of smoking-related illness in the future.

In addition, there is a significant economic cost of smoking-attributable disease in Indonesia[29]. In 2019, the Meilissa et al. report showed that direct and indirect economic costs far exceed tax revenue on cigarettes, and represented 1.16% - 2.59% of the gross domestic product. ***"The vast economic cost of smoking is a waste of resources and a burden on Indonesia's National Health Insurance System. Therefore, the government must increase cigarette taxes to correct the negative externalities of smoking consumption"***.

Reports by Global Action to End Smoking summarises the significant impact of smoking-related disease in Indonesia. ***"Coupled with the relatively high rate of smoking in Indonesia, current trends in tobacco use call for a robust public health response"***.[30,31]

In summary, smoking-related disease, disability, premature death and its burden on the economy sets Indonesia apart as a public health emergency. Moreover, smoking prevalence trends are worsening. Combined with suboptimal national tobacco control, the slow progress of THR introduction, high physician smoking rates and their misperceptions of THR and nicotine (see Doctors' Survey 2022 - Indonesia | Global Action to End Smoking)[32], urgent action is required. Indonesia represents one of the most significant opportunities for the acceleration of tobacco control through THR.

NOTABLY, COPD AND LUNG CANCER ARE AMONG THE TOP TEN CAUSES OF DEATH IN INDONESIA

42 percent of COPD deaths[33] and 55 percent of lung cancer deaths in Indonesia are attributable to smoking[33].

Calculating the "size of the price": the aim

This study aims to provide national policymakers and public health experts with estimates of the value of THR, better cessation programmes, and improved access to lung cancer diagnostics and treatment measured as ***"lives saved"*** over the next three to four decades.



5. The Approach

We compare WHO projections of future smoking deaths by 2060. These are based on continued and more effective implementation of the key components of the WHO Framework Convention on Tobacco Control (FCTC), simplified into six policy measures labelled collectively as MPOWER. Disappointingly, tobacco harm reduction (THR) was omitted from the MPOWER[34] approach. The WHO projections also leave out potential improvements in the effectiveness of cessation services, as well as access to rapidly improving diagnostics and treatments for lung cancer. We focus on lung cancer for two reasons. It accounts for 2.5 million of the 8.5 million tobacco deaths, and better diagnostics and treatment suggest that within a decade, lung cancer will no longer have a five-year survival of about 10-20% but approach the survival rate of breast cancer which has reached 80-90% in western countries.

Tobacco-related diseases are chronic conditions that take a few decades before the full benefits of cessation or harm reduction are visible in national data. This is a critical point to appreciate. Recent updates on the value of cessation (as described above) show that policy makers have overestimated how long it takes to achieve benefits from adult cessation: in terms of reduced overall mortality and in deaths from major tobacco related cancers.

All the expected premature smoking-related deaths by 2060 will occur in current adult smokers. If no person under 18 years of age started smoking today, lives saved among youth would take until the 2060s to become visible in national mortality data. This reinforces the need to focus on the behaviours of middle-aged smokers and users of toxic smokeless tobacco products, if we seek population health gains within the next several decades. Many of these smokers will be in touch with health services for early-stage COPD, tuberculosis, heart disease and possible cancer. This creates opportunities for secondary prevention (see below).

RECENT APPROACHES TO ESTIMATING "LIVES TO BE SAVED"

There have been several recent efforts to model responses to the question: ***"What would happen to the burden of disease if countries did embrace THR?"*** These have been published by academics and tobacco company researchers. We refer readers to our earlier report to obtain details called **Lives Saved: Integrating Harm Reduction for Tobacco Control in Brazil** (tobaccoharmreduction.net)[35] and **Lives Saved: Tobacco Control & Harm Reduction in LMICs** (tobaccoharmreduction.net)[35]

WHY THIS STUDY IS IMPORTANT NOW

This study comes at a time when over a billion people smoke and THR products are used by 120-140 million people globally. Most people who use THR products live in high income countries. In these countries we now have powerful evidence of the impact of THR use on the declining use of combustibles. This has been well described for countries such as Sweden, UK, Japan, and USA.[36] We believe that when faced with a clear choice of policies, responsible governments will act to save lives and be supported by civil society.

METHODS

The approaches used by seasoned ***"modellers"*** were reviewed and simplified to their essential elements. Details are contained in earlier reports. The key assumptions are repeated below.

ASSUMPTIONS

The following **assumptions** are made in calculating lives saved.

- **At present, NRTs are 10% effective in terms of cessation at one year. Vapes are twice as effective.**
- **The spectrum of THR products reduce toxic exposures by 80% and reduce smoking-related causes of premature death by 70%. We use these conservative values for comparability knowing the emerging evidence from exposure assessments and the use of bio-markers of outcome show far greater levels of reduced harm are likely.**
- **Lung cancer survival at five years will increase to 50% for most countries by 2050 driven by improvements in diagnosis and treatment.**
- **WHO estimates that cessation services (a mix of medications and behavioural support) will be 50% effective in achieving one-year quit rates by 2035 and be available to 50% of smokers by 2045. This effectiveness projection is not aligned with research findings, but for the purpose of this study, it has been accepted as a "best case assumption".**[37]
- **The rate of decline in smoking will accelerate from 2035 onwards, which will lead to health impacts increasing sharply from 2045 onwards.**
- **WHO trends suggest that from 2000 to 2025 smoking rates will fall by a third in men. We believe this could accelerate to 50% from 2030 in all countries.**

ESTIMATES FROM ABOVE ARE USED TO MODEL THREE SCENARIOS

SCENARIO 1: Status quo (traditional tobacco control). Current trends using WHO estimates. The WHO estimate of a 35% decline in global tobacco deaths from the peak of 10 million[3] is used as the basis for calculating country-specific estimates.

SCENARIO 2: Tobacco control + Implementation of THR policies and availability of THR products. Trends that include THR uptake assuming that, as a group, they will lead to a 56% decline in tobacco deaths and will become available increasingly from 2035.

SCENARIO 3: Tobacco control + THR uptake + Improved access to diagnostics and treatment of tobacco-related diseases. Trends that include THR and better access and use of diagnostics and treatments (focused mainly on lung cancer, which killed an estimated 1.8 million people in 2020).[38]

The differences between the WHO projections and those where THR alone, and THR with other measures, were calculated assuming a linear relationship between lives saved over the decades.



NOTE ABOUT THE QUALITY AND AVAILABILITY OF DATA

The quality of evidence used to develop THR policy needs to be methodologically sound. Polarization within the field of tobacco and nicotine science threatens the integrity of research.[39] Recent reviews of epidemiological and toxicological research related to THR have highlighted a range of basic concerns about methods used.[40,41,42,43]

Common issues include unclear hypotheses or methods not appropriate to test stated hypotheses; unsupported claims of causality; not controlling for potential confounding variables; amounts of product exposure not standardized or specified; non-representative study participants; and not considering effects of participants' previous combustible tobacco use.

Laboratory studies testing new technologies (such as vaping and heated tobacco devices) often use poorly reported or non-reproducible methods, under conditions incompatible with real-world use. Some papers have been formally retracted. Unfortunately, critiques and retractions cannot stop poor and biased science from being repeatedly cited and potentially misleading policy makers, physicians and consumers.

6. Potential Lives Saved by THR in Indonesia

Table 7 contains the output of the expert analysis to calculate the number of lives to be saved between 2020 and 2060 if THR and related measures are implemented. These numbers represent the additional gains, beyond those WHO estimates, that will occur because of the roll-out of MPOWER. They represent a significant number of premature deaths. Two scenarios are listed: the first includes accelerated access to THR products, while the second also includes better access to more effective cessation support and better access to treatment of lung cancer.

These numbers are indicative of what could happen if governments, health professionals, industry and consumers aligned on policies and actions. Failure to do so will leave the WHO projection the likely outcome. It was beyond this report to calculate the impact on disease and disability or the economic benefits of THR. That requires a separate, more detailed set of analyses ideally led by countries.

Note that there is growing body of evidence that shows that nicotine itself could well be beneficial for a range of neurological conditions[44,45,] of which Parkinson's Disease is a notable one. This disease is projected to have a major devastating impact across all countries over the next decades.[46] Better treatments are therefore a high priority. We have not considered the benefit of nicotine however, further, we have not considered the benefits of THR on the reduction of disease and disability caused by cigarettes and toxic smokeless tobacco products. Of the lives saved using a background of no action, 50% will occur due to MPOWER strategies and an additional 50% due to THR, better cessation, and treatment of lung cancer.

Table 7: Smoking related deaths and lives saved by 2020-2060 through tobacco harm reduction, better cessation, and lung cancer treatment

Indonesia

Annual Deaths from Tobacco (Thousands)	
2019	300
2060 WHO projected deaths per year	199
2060 projected deaths adding THR	123
THR+better cessation and lung cancer treatment = Max	83.6
Lives Saved	
2020 - 2060 total deaths - THR	3,040,000
2020 - 2060 total deaths - THR plus cessation	4,616,000

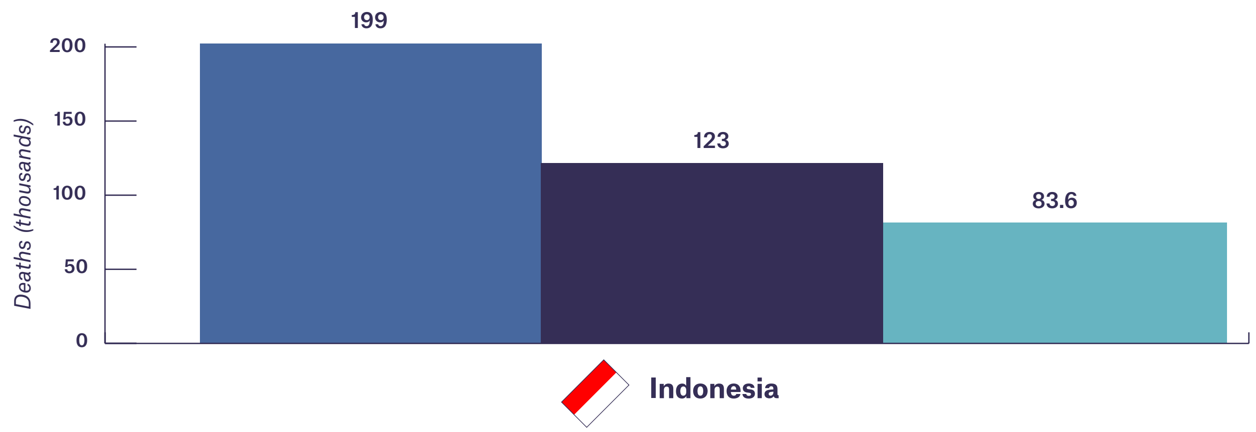


Figure 5: Projected deaths from tobacco in 2060

This figure shows the number of tobacco deaths expected to occur in 2060 using three scenarios: WHO projections using FCTC and MPOWER measures; WHO projections adding THR products; and WHO projections adding THR, smoking cessation and, lung cancer innovations.

Scenarios

- *2060 WHO projected deaths per year*
- *2060 projected deaths adding THR*
- *THR + better cessation and lung cancer treatment = Max*





4.616

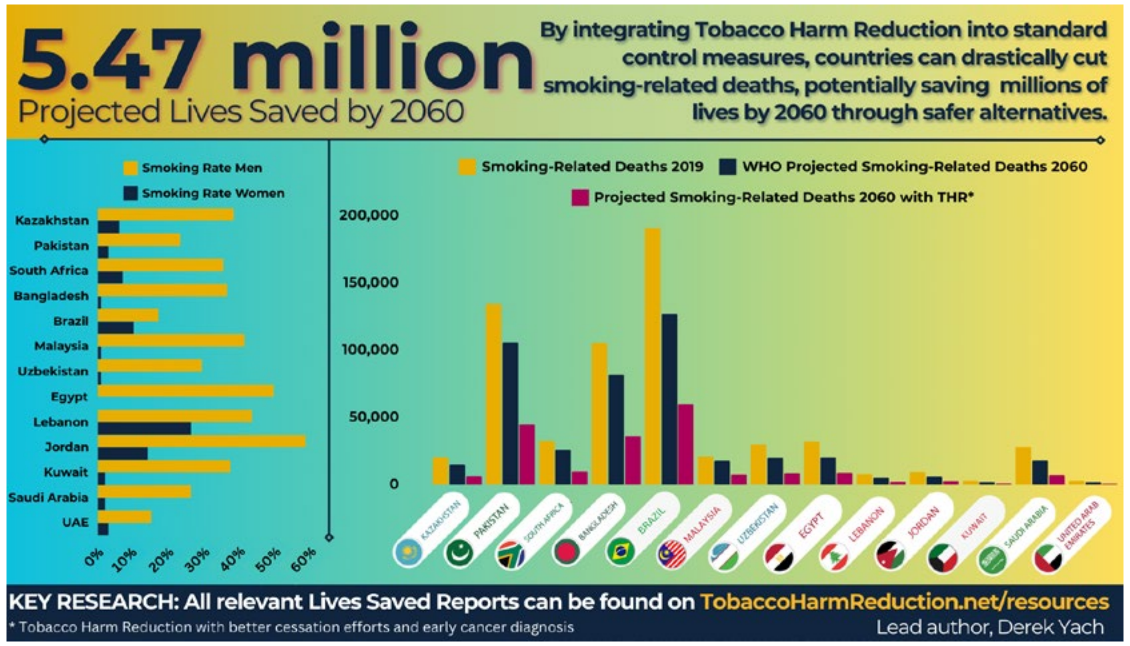
MILLION

A total of 4,616,000 lives could be saved in Indonesia if tobacco harm reduction products were made widely available, if better cessation services were delivered, and if better treatment for lung cancer was introduced over the next four decades. This represents a major opportunity for Indonesia to improve the health of their population.

7. Potential lives to be saved in other countries

Along with the report on Indonesia, our reports show by integrating tobacco harm reduction into traditional tobacco control measures, countries can drastically cut smoking-related deaths. Millions of lives can potentially be saved through less harmful smoke-free nicotine alternatives. The countries shown in figure 6 countries include a population of 897 million people, with a significant number of adults who smoke. If these countries were to embrace THR, better cessation, and more effective treatment for lung cancer, we estimate that 5.47 million lives would be saved over the next decades. Note these are over and above lives to be saved by continuing with WHO's current programs alone.

Figure 6: Potential Lives Saved by integrating THR into Tobacco Control



WHAT ACTIONS ARE NEEDED IF WE ARE TO SAVE LIVES?

Key actions needed include:

- **Activating health professionals** (especially physicians) to communicate the benefits of THR to patients in all clinical encounters, to counter disinformation about nicotine and the value of THR, and to develop national equivalents of the Royal College of Physicians (UK) report on THR and vapes.

- **Encouraging risk-proportionate regulation:** Governments should continue to revise regulations to improve access to less harmful nicotine / THR products and invest in national science and research to advance THR. Cigarettes should be substantially more regulated and taxed than reduced risk products. That makes it easier for consumers to switch and improve their health.

- **Governments should invest in national science and research.** Local investment in science has at least three effects: a) it ensures that locally relevant research is developed, b) it leads to the strengthening of local expertise and c) building local expertise in science leads to better evidence-based local policies and informed policy makers.

- **Strengthening consumer representation:** Creating and strengthening independent, science-based consumer groups able to advocate for their needs, based on sound science.

- **Where appropriate, involving religious communities:** Supporting religious leaders to guide their communities to quit smoking and support tobacco harm reduction.

A. Activating health professionals (physicians in particular), to counter disinformation about nicotine and the value of THR, to communicate the benefits of THR to patients in all clinical encounters. Drawing on the groundbreaking approaches used 60 years ago by the Royal College of Physicians (UK), they should help lead policy development by publishing a major report on the state of smoking and the role of THR in preventing and controlling tobacco-related disease, disability and premature death.

PHYSICIANS SHOULD COMMUNICATE THE BENEFITS OF THR TO PATIENTS AND COUNTER DISINFORMATION

Physicians led in the early years of tobacco control in the UK and the USA. They were the subjects of the earliest cohorts that showed that smoking kills.[47] They galvanised reports[48] that led to the first government actions. Doctors quit in large numbers once they understood the evidence, though this varied by region.[49] They started cessation services for their patients, and they led the development of public health policies to end smoking.

A new 16-country survey on trust and health[50], found that physicians remain the most trusted source of information. Physicians can be at the forefront of accelerating the demise of smoking and reducing tobacco-related disease, disability, and death – if encouraged to communicate harm reduction strategies to their patients. This needs to start with correcting the massive extent of disinformation. In a 2022 survey of 15,335 physicians in 11 countries, 77% incorrectly believed that nicotine causes lung cancer.[51] However, on average over 80% of physicians were at least moderately interested in receiving training in cessation and THR.[52]

Little information is available specific to physicians in Indonesia. More studies to identify the distinctive perceptions and knowledge of doctors in Indonesia are needed. However, the respected polling firm Ipsos recently surveyed nearly 27,000 cigarette smokers in 28 countries, regarding their views of vaping.[53] In Indonesia:

- **48% of physicians are past smokers**
- **Substantial majorities of physicians (from 87% to 97%) wrongly believe that nicotine is a direct cause of various smoking-related ailments, such as lung cancer, chronic obstructive lung disease (COPD), atherosclerosis**

However, in the same survey, most physicians (92%) correctly believe that combustion causes more harm than nicotine and 80% of physicians proactively discuss smoking with their patients who smoke, at least sometimes.

PHYSICIANS SHOULD ADDRESS MISSED OPPORTUNITIES FOR SECONDARY PREVENTION AMONG PATIENTS WHO SMOKE

Millions of people are diagnosed with conditions such as COPD, ischemic heart disease, early-stage cancer, stroke, other smoking-related diseases, and schizophrenia every year in Indonesia. Over 70 percent of people with several of these conditions smoke at the point of diagnosis. A year or two after diagnosis, international research suggests that most still smoke. Tobacco cessation is either not attempted or fails. This accelerates clinical decline and substantially adds to the burden of disease and suffering experienced by patients. Physicians should review national data on this and implement programs that give high priority to cessation and access to harm reduction at every clinical encounter.

MEDICAL AND HEALTH EXPERTS SHOULD BE ENCOURAGED TO DEVELOP A NATIONAL EQUIVALENT OF THE ROYAL COLLEGE OF PHYSICIANS REPORT ON E-CIGARETTES AND HARM REDUCTION

Over 60 years ago[54] the Royal College of Physicians published the first major report on the harm of smoking. Their voice over the decades has led policy development in the UK and around the world. Earlier this year they released their latest evidence review on e-cigarettes and harm reduction.[55] It is led by physicians and is meant to aid physicians in ***"how e-cigarettes can be used to support more people to make quit attempts while discouraging young people and never-smokers from taking up e-cigarette use."*** An equivalent report for Indonesia, that was led by prestigious medical societies and academies could galvanise needed action. Ideally, this should be a project endorsed and facilitated by the Ministry of Health.

B. Government should continue to revise and establish risk-proportionate regulation, to improve access to THR products and invest in national science and research to advance THR.

The Indonesian government should be encouraged to regulate alternative nicotine products proportionate to the risk they pose to health and in ways that maximise benefits and make healthier choices as easy as possible.

Preferably, the government regulatory progress needs to be accompanied by extensive and continuous communication programs that engage leaders in healthcare and adults who use tobacco products. The regulations should aim to balance consumer access with public health concerns, particularly focusing on preventing youth uptake while allowing adult smokers access to THR alternatives.

Good regulatory practice needs to be studied. For example, the United Kingdom approach aimed at cutting social class gradients in adult smoking through use of THR products.[56] In this world-first government-sponsored scheme, smokers are urged to swap cigarettes for vapes in a ***"Swop to Stop Scheme"***.

C. Government investment in national science and research.

Most publicly funded research on THR is carried out in the US and Europe and exported worldwide. Local investment in science and scientists has three effects: it ensures that locally relevant research is developed, it leads to the creation of local expertise and building local expertise in science leads to better informed local policies and policy makers. This has been true in all successful areas of health and science. One example of the neglect of THR research in Indonesia is that it has recorded 2.3 citations of local research per million smokers over the last decade, compared to about 500 citations per million smokers in the USA, UK and New Zealand. This hampers local innovation and limits policy makers' ability to make fully informed decisions.

D. Creating independent science-based consumer groups able to advocate for their needs.

HIV/AIDS patients and advocates rallied for better policies under the banner of ***"nothing about us, without us."*** This led to changes in government policies that included a commitment to harm reduction and led to better access to antiretrovirals. As a result, millions of people are living longer and healthier lives across LMICs. Similar progress could follow if we had effective new nicotine user groups around the world.

While there are many active nicotine user groups around the world, they have yet to galvanise into a movement with impact.[57] Their advocacy to highlight that tobacco-related deaths can be prevented, according to this study, is a much-needed element.

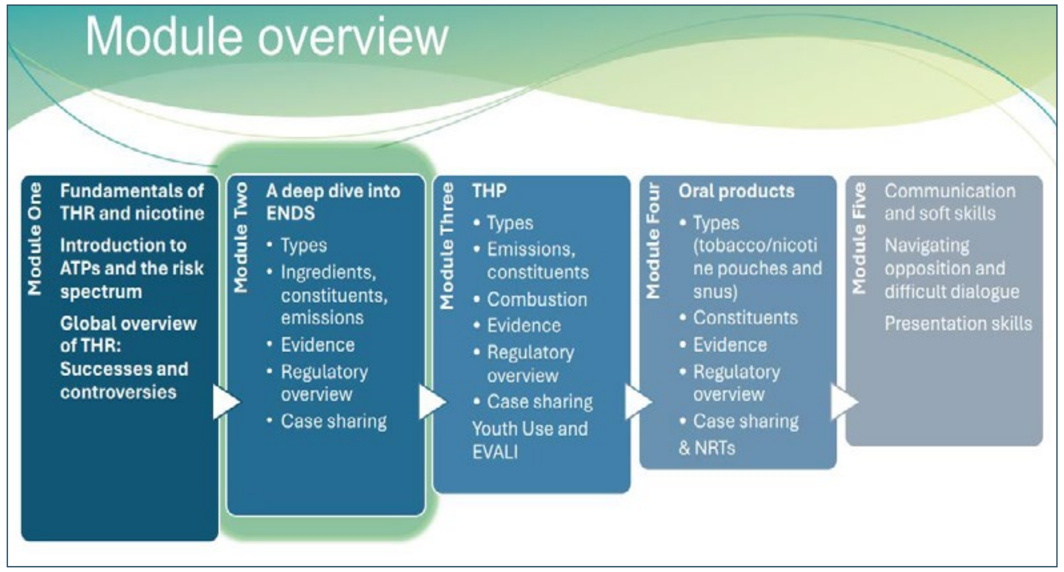
The wide support for harm reduction as a key public approach to addressing several major health issues-from alcohol and drugs, to HIV/AIDS and tobacco, suggests that Indonesian-based leading NGOs and consumer groups could play important roles beyond Indonesia and in countries where the start of understanding and support for harm reduction is still rudimentary. These include examples such as the EATHR Academy, an educational program aimed at equipping individuals with the knowledge and skills to become advocates and speakers on THR.

Figure 7: EATHR Academy, Indonesia





Center of Excellence for the Acceleration of Harm Reduction (CoEHAR)



E. Where appropriate, support religious leaders to guide their communities to quit smoking and support tobacco harm reduction.

It is time to revisit and update the way Islamic scholars and leaders could support an acceleration of the need to end deaths from tobacco. This is especially important in Indonesia - where religious leaders play a vital role in promoting health.

The first and only WHO meeting on religion and tobacco was held in 1999.[58] The meeting was chaired by Dr. M.H. Khayat, then Deputy Regional Director for the Eastern Mediterranean. The meeting acknowledged the powerful role religious leaders play in providing health advice to their communities. Of course, a quarter-century ago, there were no tobacco harm reduction options. Given that tobacco use had not spread across the world when Islam was founded, religious scholars have had to interpret texts regarding how smoking (and more recently, vaping) fits or clashes with doctrines.

Until the early 20th century, according to an article in the BMJ,[59] most Muslim jurists did not believe that smoking had any negative health effects. Some thought it might even aid digestion or reduce stress. As evidence of health risks increased, smoking became discouraged (mukrooh). Some scholars and institutions went further and declared smoking to be prohibited (haram).

Some published studies have considered how smoking cessation might be enhanced during Ramadan. Many Muslims perceived quitting smoking to be easier during Ramadan, when both religion and culture discourage smoking during the daytime fast, both in public and at home.[60] Two recent studies looked favourably at e-cigarette use for this purpose during Ramadan. One looked at vaping preferences and reasons for using e-cigarettes in the United Arab Emirates.[61] A majority reported starting vaping to quit smoking. Over half reported no withdrawal symptoms during the Ramadan fasting time.

The second study had a similar focus and findings but took place in Jordan.[62] It noted that ***"Ramadan offers a good opportunity for smokers to quit, as the reported physical and psychological e-cigarette withdrawal symptoms were found to be relatively weak."*** In both studies, e-cigarettes were accurately perceived as less risky than smoking.



8. Addenda

ADDENDUM A

IMPORTANCE OF LOCAL NATIONAL RESEARCH IN FORMULATING EVIDENCE-BASED POLICIES

The government needs local, high-quality research to fully understand the dynamics of the smoking epidemic in Indonesia, including why smoking rates remain so high and which interventions are most likely to succeed in reducing them. This should include a new approach involving researching the risks and benefits of integrating harm reduction methods into tobacco control. At the Coresta 2024 conference (Figure 8) in October 2024, Dr. Derek Yach, former WHO Director, highlighted the changes needed in tobacco control research. Derek also emphasized the necessity of aligning local efforts with global initiatives to ensure comprehensive and effective tobacco control.[1]

Figure 8: Proposed priorities for THR research

Proposed Priorities for THR Research: for discussion

- **Global research**
  - Long term effects on health
  - Health effects of nicotine
  - Relative effectiveness of cessation across all THR categories
  - Improving secondary prevention among high-risk tobacco users
  - Strengthening the quality of epidemiological and behavioral science
- **Country and regionally specific research**
  - Surveillance- combining questionnaires and biomarkers
  - THR product trends by age, sex, amount
  - Health care providers use, knowledge and advise about THR
  - Youth access trends and intervention impact
  - Product content assessment
- **Research to adapt policies from high income countries with declining smoking rates to LMICs**

Local research: Satyana et al.'s study is an example of such critical research in Indonesia, providing an in-depth analysis of how smoking affects working-age individuals and demonstrating the massive economic and health tolls[28d]. This study, rooted in local data, helps tailor tobacco control strategies specifically to Indonesia's unique demographic, economic, and cultural contexts. National research, particularly in collaboration with local universities, can help answer key questions such as:

- **What drives high smoking rates, particularly among men?**
- **Which policies, such as taxation, public health campaigns, or smoking cessation programs, are most effective in reducing smoking rates?**
- **What are the social, economic, and cultural barriers to reducing tobacco consumption in Indonesia?**



Local Universities: Collaborating with local universities ensures that research is grounded in the local context and leverages academic expertise and resources. Without this research, policies risk being ineffective or misaligned with the local context. Localized studies allow the government to assess the real-world impact of current tobacco control policies and guide future initiatives more effectively.

The Centre of Excellence for the Acceleration of Harm Reduction (CoEHAR) in Indonesia, along with the EATHR Academy, are actively implementing local research projects to substantiate the value of harm reduction in tobacco control, including projects showing THR benefits in oral health, skin and eye care. They are planning a THR Summit at their research centre during May 2025.

TB and Smoking: A Deadly Combination

Tuberculosis (TB) is a major global health issue, particularly in countries with high smoking rates like Indonesia. TB and smoking are closely linked, as smoking weakens the immune system, making smokers more susceptible to TB infection and increasing the likelihood of **active TB** in those already infected. Smoking also exacerbates the severity of TB, leading to worse outcomes and a higher risk of death from the disease.

- **Increased Susceptibility:** Smoking damages the lungs and weakens the immune system, which increases the risk of contracting TB. Studies show that smokers are about twice as likely to develop **active TB** compared to non-smokers.[2]

- **Worsened TB Outcomes:** Once infected, smokers are more likely to develop active TB, which can be fatal if not treated properly. Smoking also increases the risk of recurrent TB and worsens the overall prognosis for those infected.[3] A systematic review of TB and smoking found that smokers have worse treatment outcomes, including higher rates of mortality.[4]

- **Mortality and TB:** Smoking has been identified as a key factor contributing to **TB mortality**. The risk of dying from TB is higher in smokers, making the combination of TB and smoking particularly deadly[5]. Smoking-related mortality from TB can be reduced with tobacco cessation interventions integrated into TB programs.[5]

In countries like Indonesia, where both TB and smoking rates are high, the combination of smoking-related illnesses, TB, and other risks (like **alcohol consumption, poor diet,** and **obesity**) places a heavy strain on already overwhelmed health systems.[7] The **COVID-19 pandemic** added further pressure, particularly in treating patients with pre-existing smoking-related respiratory conditions like TB.[8]

Reducing smoking rates could significantly reduce the TB burden in countries like Indonesia. Evidence suggests that comprehensive tobacco control measures, including smoking cessation programs, can reduce TB incidence and improve treatment outcomes for TB patients.[5] Given the strong link between smoking and TB, **integrating tobacco control** into **TB prevention** and treatment programs could be a key strategy for reducing the overall disease burden and relieving pressure on the health system.[3]

Key Points of Importance:

- **Public Health Integration:** More research is needed to develop customised smoking cessation programs and to incorporate anti-smoking campaigns into TB prevention efforts.[2]
- **Health System Relief:** Reducing smoking rates will help alleviate the pressure on health systems strained by the triple burden of communicable diseases (like TB), non-communicable diseases (like COPD), and emerging threats (like COVID-19).[6]

Addendum References Section [63]

ADDENDUM B

SAFEGUARDING WOMEN AGAINST SMOKING IN INDONESIA

Preventing smoking uptake among women in Indonesia is essential, not only for their individual health but for broader public health goals. As seen in other countries, such as the UK, a rise in female smoking rates would lead to increased rates of lung cancer, heart disease, and other tobacco-related illnesses. If female smoking rates were to increase, the healthcare burden would rise, and the health gap between men and women could narrow in the wrong direction. Indonesia has an opportunity to avoid this trend by maintaining low smoking rates among women through proactive policies. Lessons can be learned from other countries where female smoking rates rose after targeted marketing, leading to long-term health consequences.

Targeted Prevention: Learning from the Success of Youth Marketing Restrictions

Youth as a Precedent: Many countries, including Indonesia, have restrictions on tobacco marketing aimed at youth. These restrictions are designed to prevent the next generation from taking up smoking by limiting advertisements, sponsorships, and product placements aimed at younger audiences. This model can be extended to prevent marketing that targets women, who might be increasingly seen by the tobacco industry as a growth market, especially if male smoking rates plateau or decline.





Industry Accountability: The tobacco industry should be required to show that they are not targeting women with marketing campaigns or products, just as they are required to demonstrate they do not market to youth. Such measures could include:

- Limiting advertising that appeals to women (e.g. packaging, slogans, social media campaigns).
- Banning sponsorships of events, causes, or influencers that predominantly appeal to women.
- Monitoring compliance through independent regulatory bodies to ensure that women are not being seen as a new target market.

Promotion of Positive Health Behaviours

- **Supporting Women's Health Goals:** Public health campaigns should emphasize the importance of maintaining non-smoking as the socially desirable behaviour for women. Educational campaigns, workplace policies, and media initiatives can reinforce the message that smoking is harmful, and that non-smoking is associated with better health, productivity, and family well-being.

- **Community Involvement:** It is also essential to engage local communities and women's organizations in spreading these messages. Grassroots initiatives can be particularly effective in sustaining low smoking rates among women by fostering a supportive environment where women choose not to smoke and encourage others to do the same.

The Indonesian government has a unique opportunity to prevent the rise in female smoking rates by implementing policies that support and reinforce low smoking prevalence among women. Learning from global experiences, especially in countries where smoking rates increased due to targeted marketing, can help Indonesia avoid a similar trajectory.

Just as restrictions on tobacco marketing to youth have proven successful, similar measures can ensure that women are not the next target for the tobacco industry. By focusing on prevention and promoting non-smoking as the ideal health behaviour, Indonesia can safeguard the health of its female population and reduce the overall burden of tobacco-related diseases.



ADDENDUM C

HEALTH ECONOMIC IMPACT OF SMOKING IN INDONESIA

Smoking's Enormous Health and Economic Impact: The study by Satyana et al. demonstrates the extensive burden that smoking places on Indonesia's population.[28d] With over 67.2% of working-age men and 2.16% of women smoking, the health consequences are staggering. The study estimates that smoking contributes to 846,123 excess deaths and the loss of 2.9 million years of life. Additionally, smoking is responsible for the loss of 41.6 million QALYs (quality-adjusted life years) and 15.6 million PALYs (productivity-adjusted life years), meaning that smoking not only shortens lives but also reduces the quality of life and the ability to work productively. This creates a vicious cycle of illness, reduced productivity, and economic loss.

Economic Losses Threaten National Development: Beyond the human toll, smoking places a significant economic burden on Indonesia. According to the study, the total cost of productivity loss due to smoking is estimated at US$183.7 billion for the working-age population. Additionally, smoking is expected to cost US$1.8 trillion in healthcare expenses over time. Over a one-year period, US$10.2 billion is lost in GDP due to reduced productivity, while healthcare costs soar to US$117 billion. These enormous economic losses threaten the country's development goals by diverting resources away from essential sectors and health infrastructure development. The economic burden is directly tied to the widespread prevalence of smoking, making it clear that addressing smoking through research-backed policies would not only improve health outcomes but also significantly improve national economic resilience.

Global Economic Cost of Smoking-Attributable Diseases: A study published in Tobacco Control estimated the global economic cost of smoking-attributable diseases at $1.4 trillion annually, which is equivalent to 1.8% of the world's annual GDP. This includes direct healthcare costs and indirect costs such as lost productivity due to illness and premature death.

Economic Costs of smoking in other countries:

- **India:** Research in India has shown that the economic costs of diseases and deaths attributable to tobacco use were approximately $22.4 billion in 2017-18. This includes healthcare costs and productivity losses, highlighting the significant economic burden of smoking in a developing country context.
- **Productivity Burden in Australia:** A life table modelling study in Australia found that smoking-related productivity losses amounted to $388 billion over the lifetime of the 2016 population. This study underscores the long-term economic impact of smoking on national productivity.
- **Impact on Health and Work Productivity in Malaysia:** In Malaysia, the economic impact of tobacco use on health and work productivity was estimated to be $1.2 billion annually. This includes both direct healthcare costs and indirect costs due to lost productivity.

CONCLUSION

The economic impact of smoking in Indonesia is profound, with significant direct and indirect costs burdening the healthcare system and the economy. By learning from global examples and implementing comprehensive tobacco control measures, Indonesia can reduce the economic and health burdens of smoking. Increasing cigarette taxes, enforcing advertising bans, and promoting smoking cessation programs are critical steps towards achieving a healthier and more prosperous future for Indonesia.

Evidence shown in this report would argue for the strengthening of risk-proportionate regulation and taxation of tobacco and nicotine products, to incentivise especially adult male smokers to switch to less harmful, smoke free nicotine alternatives. The prevention and control of smoking-related disease, disability, premature death and economic cost, including a comprehensive cost-benefit analysis of the integration of harm reduction methods into tobacco control, should be a top priority for local research.

9. About the Authors



DR. DEREK YACH (PROJECT LEADER) – USA, SOUTH AFRICA

Dr. Yach is a former employee of the World Health Organization and of PepsiCo. He received his MBChB from the University of Cape Town in 1979 and his MPH from Johns Hopkins School of Public Health in 1985. In 2007, he received an honorary DSc from Georgetown University. For several years Yach led major national epidemiological initiatives in South Africa. Yach then served under Director-General Gro Harlem Brundtland, as a cabinet director where he worked on the WHO Framework Convention on Tobacco Control and the Global Strategy on Diet and Physical Activity. He led global health at Yale School of Public Health and then at the Rockefeller Foundation before becoming SVP for Global Health and Agriculture Policy at PepsiCo. After 5 years developing and leading the Vitality Institute for Prevention in New York, he founded and led the Foundation for a Smoke Free World. Currently Yach is an independent global health consultant focused on ending smoking, supporting mental health and promoting healthy diets. He has served on advisory boards of the World Economic Forum, Clinton Global Initiative, and Wellcome Trust.



ASSOCIATE PROF. RONNY LESMANA - INDONESIA

Associate Professor Ronny Lesmana is a Medical Doctor, Exercise Physiologist, and holds a PhD in Integrative Physiology. He is a dedicated professional with two decades of experience in exercise physiology. Throughout his career, he has focused on understanding the relationship between physical activity, environmental factors, including tobacco smoking, and health. He applies evidence-based practices to help individuals improve their fitness and overall well-being. His expertise includes developing personalized exercise programs, designing and recommending dietary nutraceutical supplements, conducting fitness assessments, and providing guidance on lifestyle modifications. He is passionate about promoting healthy habits and empowering clients to achieve their fitness goals through tailored interventions and education.

Associate Professor Lesmana has also been actively involved in the REPLICA project for over five years, collaborating with six countries alongside COEHAR Catania. In this project, he explores the negative risks and potential mechanisms of tobacco and vaping compared to Tobacco Heating Products (THP) as part of harm reduction efforts.

As part of the smoking cessation process, he encourages individuals to discontinue tobacco smoking and adopt safer, less harmful approaches, which are crucial for improving health outcomes and reducing the risk of smoking-related diseases. His research explores the effects of tobacco smoke on cellular systems, the mechanisms of addiction, and evaluates the efficacy of various cessation aids and therapies. These studies aim to identify potential biomarkers for smoking-related damage and assess how different compounds may support the cessation process.



PROF. DR. AMALIYA - INDONESIA

Amaliya Amaliya holds a PhD in Dentistry-Periodontology (2011-2014), from the University of Amsterdam, The Netherlands and a Master's in Periodontology (2004-2006) from the same university. She studied for her degree as Doctor of Dental Surgery at the Universitas Padjadjaran, Indonesia 1991-1997).

Amaliya is currently Lecturer and Researcher at Dental Faculty – Universitas Padjadjaran, (since 1999) and Researcher at Indonesian Public Health Observer (since 2016). Research interests: Vitamin C and periodontal disease; nutrition and oral health; tobacco harm reduction.



PROF. RICCARDO POLOSA - ITALY

Riccardo Polosa is full Professor of Internal Medicine at the University of Catania and founder of the Center of Excellence for the Acceleration of Harm Reduction.

A full professor of internal medicine at the University of Catania with a specialist role as a respiratory physician, clinical immunologist, allergist and rheumatologist, Polosa is also the founder of the Center for Tobacco Research at the University of Catania, where contracted research staff conduct high-profile clinical and behavioural research. The focus of his academic research has been historically centred upon the investigation of mechanisms of inflammation, biomarkers of disease activity, and novel drug target discovery in respiratory medicine (asthma, COPD, rhinitis) and clinical immunology (allergic and autoimmune diseases). This has culminated in the participation of his research group in large EU-funded Pan-European research consortia. Nonetheless, over the last 15 years, his main research interest has progressively shifted in tobacco-related diseases, smoking prevention and cessation, tobacco harm reduction and e-vapor products.

More specifically, he has been involved in the behavioural, clinical, physiological and toxicological evaluation of e-cigarettes for over 10 years. He was the project lead of the first RCT in the world about effectiveness and tolerability of e-cigarettes (the ECLAT study), he is the most prolific author in the field of e-cigarettes, according to recent bibliometric research. He is a member of the Scientific Committee of LIAF (Italian Anti-Smoking League) and of INNCO (International Nicotine Consumer Organization). Already national coordinator for the Italian Working Group on electronic cigarettes and e-liquids, he has been elected convenor for the European Working Group on requirements and test methods for emissions of electronic cigarettes within the European Committee for Standardization (CEN/TC 437).



PROF. GIOVANNI LI VOLTI - ITALY

Professor Giovanni Li Volti is a Full Professor of Biochemistry at the Department of Biomedical and Biotechnological Sciences at the University of Catania, Italy. He graduated in Medicine and Surgery from the University of Catania in 2000 with top honors. After his graduation, he attended the Department of Pharmacology at the New York Medical College. In 2005, he obtained his PhD in Pediatric Sciences from the University of Catania.

Professor Li Volti has held various research positions, including a research fellowship at the Department of Anatomy at the University of Brescia in 2006. He has received numerous national and international awards for his research contributions, such as the Aventis Pharma New Investigator Award and the Young Scientist Award at the FEBS meeting.





PROF. MAREWA GLOVER – NEW ZEALAND

Professor Marewa Glover is one of New Zealand's leading tobacco control researchers. She has worked on reducing smoking-related harm for 31 years. She is recognised internationally for her advocacy on tobacco harm reduction; and locally was a Finalist in the New Zealander of the Year Supreme Award in 2019 recognising her contribution to reducing smoking in NZ. In 2018, Dr. Glover was appointed Tobacco Section Editor for the Harm Reduction Journal. In that year she also established the Centre of Research Excellence: Indigenous Sovereignty & Smoking, an international programme of research aimed at reducing smoking-related harms among Indigenous peoples globally. The Centre's research was funded with a grant from Global Action to End Smoking (formerly known as Foundation for Smoke-Free World), an independent, U.S. nonprofit 501(c)(3) grant making organisation, accelerating science-based efforts worldwide to end the smoking epidemic. Professor Glover contributed to this report independently.



DR. DELON HUMAN – SOUTH AFRICA, FRANCE

Dr. Delon Human is a specialist family physician, global health advocate, published author, international speaker and healthcare consultant specialising in global health strategy, harm reduction and health communication. He is the former Secretary-General of the World Medical Association, International Food and Beverage Alliance and Co-founder of the African Harm Reduction Alliance (AHRA). He has acted as an adviser to three WHO Directors-General and to the UN Secretary-General on global public health strategies.



DR. HIROYA KUMAMARU – JAPAN

Dr. Hiroya Kumamaru is a cardiovascular surgeon and vice director of AOI International Hospital in Kawasaki, Japan, a position he has held since April 2013. A graduate from the School of Medicine at Keio University, Kumamaru studied cardiovascular surgery in Europe and the United States. His professional experience includes time spent as director of the K.I. Akihabara Clinic (July2008 to March 2013), chief surgeon of the department of cardiovascular surgery at Kawasaki Municipal Hospital, Kanagawa (July 2005 to March 2008) and senior cardiovascular medical director and group leader of clinical scientific affairs at Pfizer Japan (April 1996 to June 2005). He has been working on preventive medicine for more than 10 years and tobacco harm reduction is the one of the biggest issues for that area.



PROF. KARL FAGERSTRÖM - SWEDEN

Prof. Karl Fagerström is a psychologist and founding member of the Society for Research on Nicotine and Tobacco (SRNT). He was awarded the World Health Organization medal in 1999 for his outstanding work in tobacco control. In 2013 he was the recipient of the Award on Clinical Science from the Society for Research on Tobacco and Nicotine. He has been part of the early development of the nicotine replacement products and developed the first non-tobacco nicotine pouch.



DR. GINTAUTAS-YUOZAS KENTRA - KAZAKHSTAN

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Lives Saved: Tobacco Control & Harm Reduction in LMICs
Lives Saved: Integrating Harm Reduction into Tobacco Control in Malaysia and Uzbekistan
Lives Saved: Integrating Harm Reduction into Tobacco Control in Czechia
Saving lives like Sweden

All available at www.tobaccoharmreduction.net

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